

A case report of pneumocephalus in klebsiella pneumoniae: An often forgotten complication

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Abstract

Background: Pneumocephalus is a condition characterized by the ingress of air into the cranium. It is usually caused by trauma or surgical intervention. Spontaneous non-traumatic pneumocephalus is an unusual condition. We report a rare case of spontaneous pneumocephalus in a patient with *Klebsiella pneumoniae* without preceding trauma.

Case presentation: A 76 years old presented to the emergency department complaining of headache and vomiting for 3 days. He was intubated due to respiratory failure. Computed Tomography (CT) scan of the brain showed extensive pneumocephalus with hypoxic ischaemic changes. Blood culture and sensitivity revealed *Klebsiella pneumoniae*. Despite antibiotic treatment with Meropenem, Ceftriaxone and Unasyn and supportive therapy, our patient deteriorated and died 10 days after admission. The family did not give consent for autopsy.

Conclusion: Early identification of pneumocephalus may help to decrease the morbidity and mortality as well as avoid possible complications.

Keywords

pneumocephalus; klebsiella pneumonia.

Introduction

Pneumocephalus implies intracranial air collection. The causes of pneumocephalus can be trauma and non-traumatic origin. Markham *et al.* reported that cranio-facial trauma is the commonest cause of pneumocephalus, accounting for 75% of the cases [1]. The non traumatic etiological factors could result from surgical intervention including cranial and spinal procedures, neoplasms or infection [1,2]. There are only few reports on pneumocephalus due to intracranial infection namely meningitis. Spontaneous pneu-

mocephalus caused by meningitis is an extremely rare cause in the absence of trauma or neurosurgical procedure. We reported a fatal case of spontaneous pneumocephalus due to anaerobic organisms, resulting in brain death.

Case Report

A 76 years old gentleman presented with fever and vomiting for 1 week. He was noted on the day of admission to be confused and restless, with a temperature of 38.5°C. He had no neurological deficit or neck stiffness. He became progressively unresponsive over the next several hours and was intubated for airway protection in view of respiratory distress.

Arterial blood gas showed metabolic acidosis with random blood glucose of 23.5 mmol/L. The patient was initially treated with diabetic ketoacidosis secondary to sepsis of unknown origin. Intravenous Ceftriaxone 2 g stat and insulin were administered. Blood and urine cultures were obtained. Laboratory studies included a white blood count of 13.500 μ L and hemoglobin of 13.8 g/L. Electrolytes showed hypokalaemia (3.2 mmol/L).

However, his condition was complicated with atrial fibrillation when he was in the intensive care unit. Echocardiogram showed good LV function with EF 55-60%. Normal chamber size. No clot or pericardial effusion. Chest radiography was unremarkable. His generalized condition was ill with poor GCS recovery even after 48 hours stay in ICU. Thus, Computed Tomography (CT) of the head was ordered and demonstrated diffuse pneumocranium with hypoxic ischaemic changes. No skull defect was noted. There was evidence of sinusitis.

Blood culture grew *Klebsiella pneumoniae* and he was treated with IV Tazocin.

Patient was then succumbed after 10 days of admission with multiorgan failure. Family refused post mortem examination.

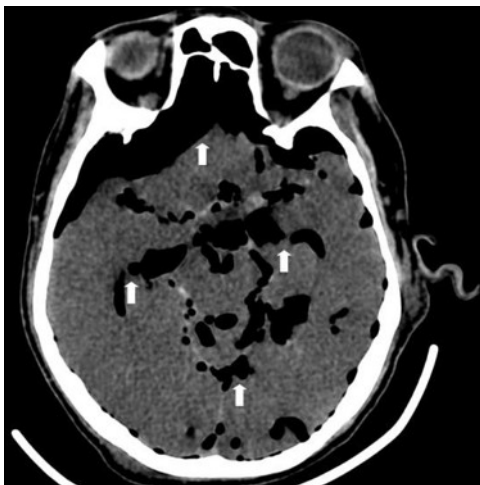


Figure 1: Plain Computed tomographic scan of the brain reveals extensive air locules (white arrow) within the cerebral hemispheres and ventricles.

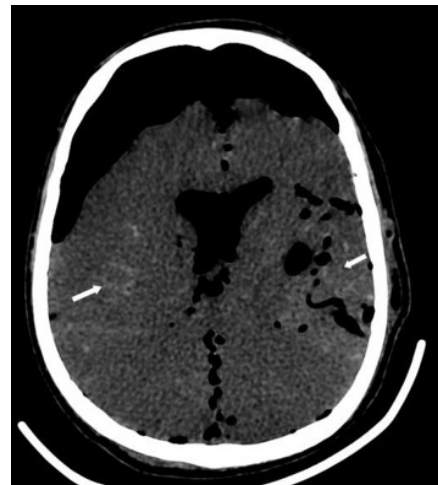


Figure 1: Plain CT brain demonstrates bilateral pseudosubarachnoid signs (white arrow) with loss of grey white matter differentiation in hypoxic ischaemic encephalopathy and massive pneumocephalus.

Discussion

Pneumocephalus is defined as the presence of air or gas within the cranial cavity [3]. It is usually a consequence of skull defects resulting from trauma or iatrogenic [1]. Spontaneous pneumocephalus has been traced to various etiologies [1-2,4]. According to Markam, infection accounted for 9% of the 295 cases reviewed whereby mostly chronic otitis media. Occasionally, rare entity like gas forming organisms causing meningitis can lead to pneumocephalus⁴. Unlike other forms of pneumocephalus, there will be no direct communication between the brain, air cells or the ambient air with gas producing organisms.

The presenting symptoms for pneumocephalus are usually vague. 38% of the patient presented with headache and other clinical manifestations including nausea, vomiting, seizure, dizziness [1]. Pneumocephalus could be diagnosed by plain skull radiograph, CT scan or MRI. CT is however remains as gold standard for diagnosis of pneumocephalus. Presence of only 0.55 ml of air is sufficient to be detected by CT, whereas at least 2 ml of air is required to be seen on plain skull radiograph. MRI is not as sensitive as CT in this circumstance [5].

But CT is a gold standard for diagnosis of pneumocephalus. It only requires 0.55 ml of air to be detected, whereas a simple skull radiograph requires at least 2 ml. MRI is not as sensitive as a CT scan [5].

Pneumocephalus resulting from meningitis is a rare entity with high mortality rate in the setting of multiorgan failure [6]. The cause of large quantity of intracranial air production was unclear in this patient until *Klebsiella pneumoniae* was cultured from the blood.

Although adequate antimicrobial and supportive therapy was given to our patient, he continued to deteriorate and eventually died. Previous studies on *Klebsiella* meningitis reviewed high mortality rate in *Klebsiella* meningitis despite optimal treatment [6]. Clinician should be aware of bacterial meningitis caused by gas producing organisms in patients with pneumocephalus in whom no obvious cause for pneumocephalus can be established.

Conclusion

Meningitis should be considered as a possible cause of pneumocephalus even though it is uncommon. Early suspicion and correct diagnosis with the aid of CSF analysis and radiological study are essential in delivering the appropriate therapy at time.

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